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APPLEWORKS IN ACTION, P. 46

# BOOST YOUR GS' POWER

**Make the Switch  
To System 6**

**INVESTIGATING  
HARD DRIVES**

## REVIEWS

- Pointless
- Macintosh LC II
- Secrets of Bharas
- HyperStuff Collection
- Bank Street  
Writer Mac



12"

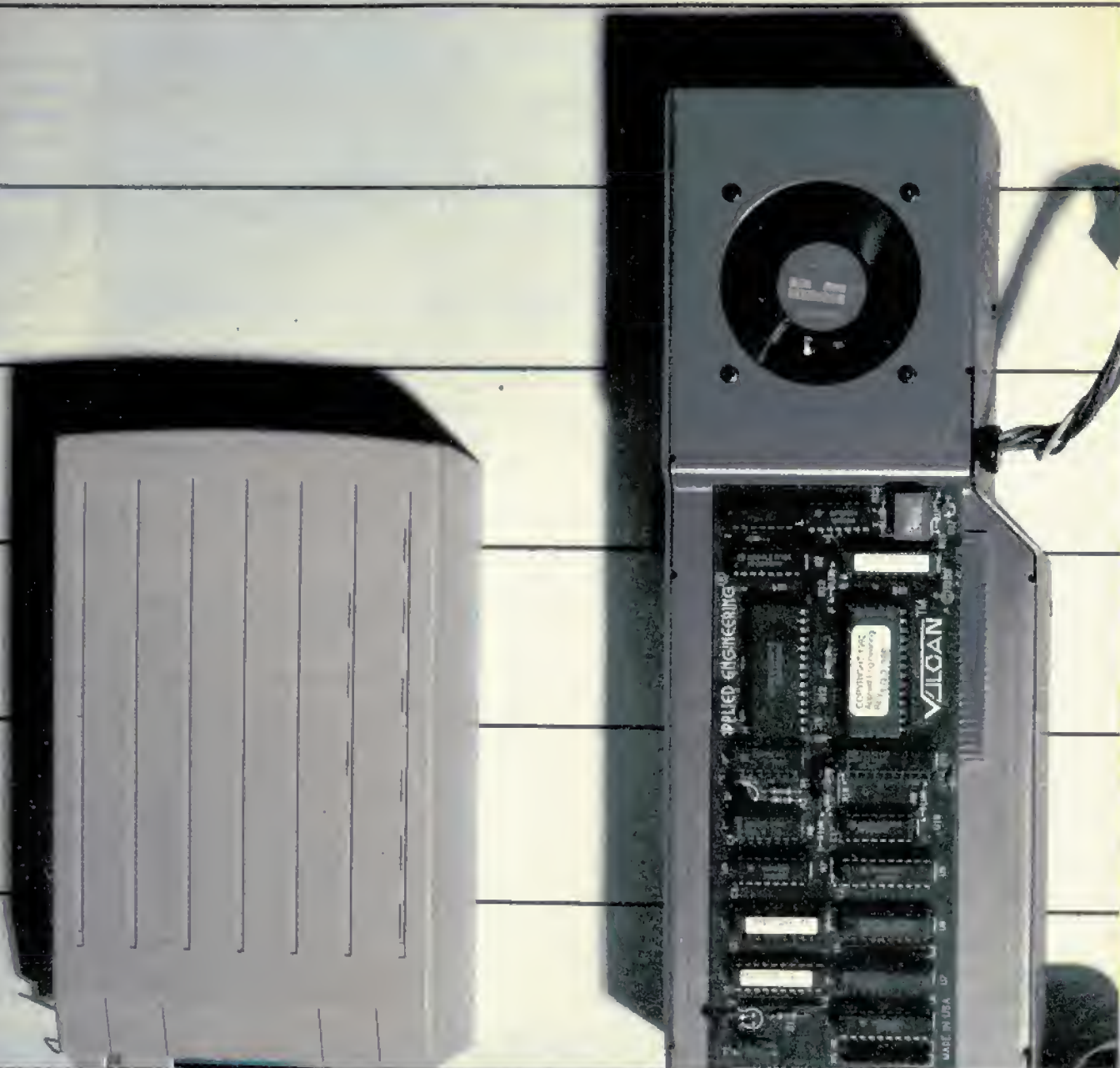
10"

8"

6"

4"

2"

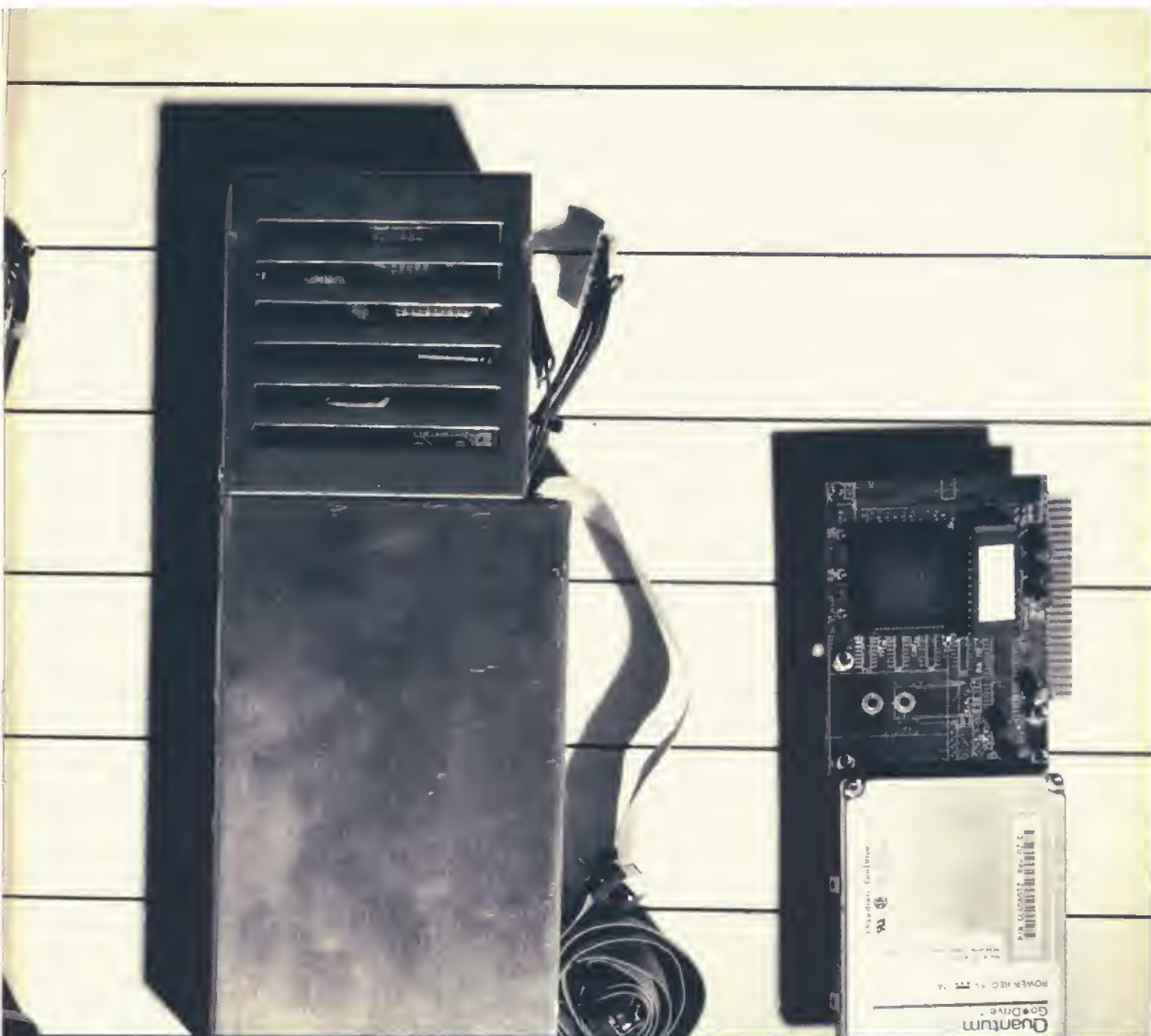


# WANTED

## Hard Drives on the Run

By CAMERON CROTTY





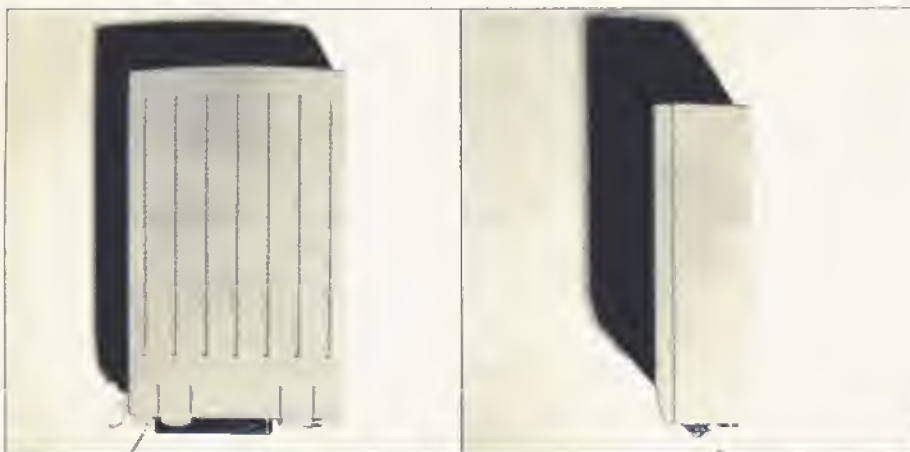
**H**ard drives are bad for you — they change ordinary, innocent people into slaving space hogs with bad archiving habits. In months you'll be reduced to a wild-eyed drooling monster. "Only 40 megabytes?" you'll say. "I must have more storage!" Don't laugh. We've seen it happen.

With these warnings in mind, let's turn to the current crop of hard-drive suspects and investigate their relative speeds, capacities, strengths, and

shortcomings. Not that you should go out and actually buy one of these Agents of Chaos. This data is for informational purposes only.

### THE LINEUP

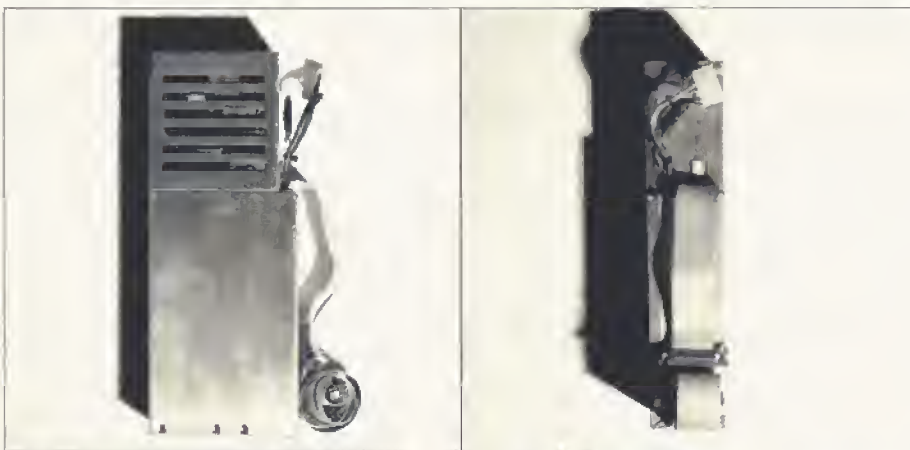
These days, you can practically buy a hard drive at the supermarket, right next to the cigarettes and skin magazines. These generic drives with loose morals can be connected to any computer with a SCSI (*small-computer-*



**NAME:** Shadow 105 LPS  
**MAKER:** TMS Peripherals

**ALIAS:** The Paladin  
**MECHANISM:** Quantum ProDrive LPS

**REMARKS:** Have SCSI, will travel. Available for hire for either Apple II or Macintosh jobs. Reasonable rates. Loner. Shareware included as part of the service. Top honors in the straight and narrow.



**NAME:** Pegasus 100i  
**MAKER:** Econ Technologies

**ALIAS:** Pale Rider  
**MECHANISM:** Quantum ProDrive LPS

**REMARKS:** Tops the Four Most Wanted list. Specializes in behind-the-scenes action. Sought in connection with RamFast SCSI job. Considered armed and dangerously powerful. Drives Apple II High-Speed getaway vehicle.

systems interface) port, be it Apple II or Mac. We've even heard reports of especially sleazy removable-drive owners sharing their drives between two computers.

Our investigation is more focused. We wanted to take down the hard-drive pushers targeting the Apple II market specifically. So we placed the four newest offenders under interrogation. Three of the four drives we tested — Zip Technology's **ZipDrive IIGs**, Applied Engineering's **Vulcan Gold 100**, and Econ Tech's **Pegasus 100i** — are internal drives intended exclusively for the GS. (Econ and Zip promise IIe versions in the near future.) The fourth drive, TMS'

Shadow **105 LPS**, is an external SCSI drive; the company will preconfigure it for either Mac or Apple II. Join us as we shine the light of day on these purveyors of pulchritude.

#### YOU HAVE THE RIGHT TO AN ATTORNEY

We gave these "hardened" criminals no rights at all. We ripped 'em out of the packaging and slapped 'em down on the table, naked and quivering. Then we pulled on our black gloves and worked 'em over. It wasn't pretty, but you can see the results for yourself in the accompanying **Table**. All tests (except Test 1) were

performed on a stock ROM 03 Apple IIcs with 1.25 megabytes of RAM, two 3.5-inch drives, and, where appropriate, an **Apple II High-Speed SCSI Card**. We formatted the drives with GS/OS System 5.0.4 and ProDOS 1.9. As a comparison benchmark, we subjected a hapless Apple 3.5-inch floppy drive to our rigorous testing, as well.

For **Test 1**, we simply turned on the computer and timed how long it took for the "Welcome to the Apple IIcs" message to appear. This figure represents how long it takes each drive come up to speed. Because CV Technologies' **RamFast SCSI** card waits for a hard drive to come on line before it continues booting the GS, we used it to test the warm-up speeds of the Pegasus and the Shadow. The Zip came out on top, with the rest of the field an almost uniform three seconds slower.

If you use GS/OS regularly, **Test 2** shows how much time you'll have to spend twiddling your thumbs before you can get to work. We started the clock when the "Welcome" screen appeared and stopped it when the arrow cursor appeared on the Desktop. Here the Vulcan Gold flew ahead of the pack, thanks to a proprietary interface and a freshly revamped GS/OS driver. It went from the "Welcome" screen to the Desktop in little more than 12 seconds — almost twice as fast as any other drive.

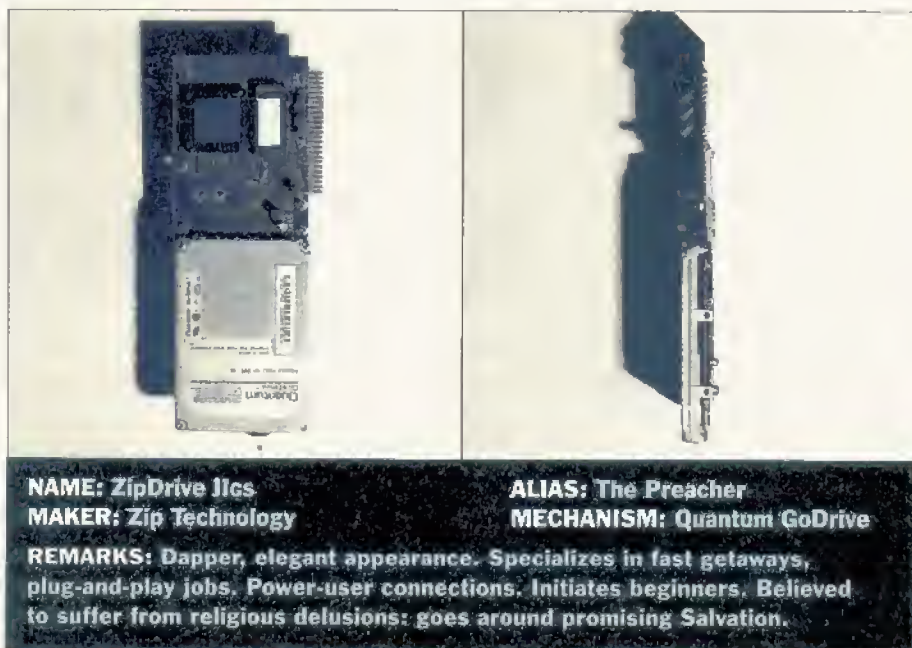
The elapsed times evened out in **Test 3**. To simulate real-world churn and burn, we launched AppleWorks GS from the Desktop. The Zip DriveGS was ahead by a nose.

Next, we tested the drives' linear-read speed by using the GS/OS *Verify* command on the boot volume. This test measured a drive's ability to read sequential blocks from the disk. Drives with proprietary interfaces suffered in **Test 4** owing to a lack of DMA (*direct memory access*) capacity. The Apple II High-Speed SCSI card uses DMA to stuff information directly into your Apple's RAM, greatly increasing the speed of certain operations. Riding this boost, the TMS Shadow took top honors, while the Pegasus ran a close second.

For the final three tests, we left our stopwatch behind in favor of a more accurate tool: the *Drive Statistics* module of Glen Bredon's **ProSel-16** utility package. This module measures linear-read speed, random-read speed, and speed of driver software and interface in milliseconds per block.



The linear-read results in **Test 5** mirror the times of the *Verify* test almost exactly. The random-read experiment, **Test 6**, reads blocks selected randomly from your drive, simulating the kind of work your hard drive has to do when its files are fragmented. Should you bother defragmenting your hard drive? Here's your answer. Again thanks to the interface and driver, the Vulcan Gold came out on top. Operating-system overhead, **Test 7**, separates the performance of the driver software and interface from the benefits or deficiencies of the drive hardware. Poor times turned in by the Pegasus and the Shadow show the price paid by the GS' generic *SCSI.HD* driver. Both the Zip and the Vulcan Gold come with their own more efficient GS/OS drivers.



**NAME:** ZipDrive IIcs  
**MAKER:** Zip Technology

**ALIAS:** The Preacher  
**MECHANISM:** Quantum GoDrive

**REMARKS:** Dapper, elegant appearance. Specializes in fast getaways, plug-and-play jobs. Power-user connections. Initiates beginners. Believed to suffer from religious delusions: goes around promising Salvation.

#### GETTING THE WHOLE STORY

All four drives are easy to install and come with ample documentation. The Vulcan Gold and Econ Pegasus require you to remove your old power supply, but the manuals for both drives are well illustrated. Likewise, the fit and finish on all drives is up to snuff, with the possible exception of the Zip drive; the card-and-mechanism-tacked-together-with-aluminum-crossbars look is just a bit cheesy. But when was the last time you stress-tested your Apple IIcs?

Our TMS Shadow unit came stuffed with nearly 26 megabytes of Apple II shareware. The Shadow is also potentially the most versatile drive of the bunch. It's a standard SCSI external, which means it's just as happy hooked up to a Mac as it is to an Apple II. If you want to take it on the road without worrying about extra power

outlets, you can buy a cord that plugs into a DB-25 floppy-drive port, called the *SmartPort* on an Apple IIcs.

We qualified our statement with the word *potentially* because there's only one 50-pin SCSI connector on the back of the drive. To create a SCSI chain, you have to fiddle with special splitter cables. We also had one pet peeve: Why is it that when a company introduces a "compact external hard drive," chances are all it's done is remove the power supply?

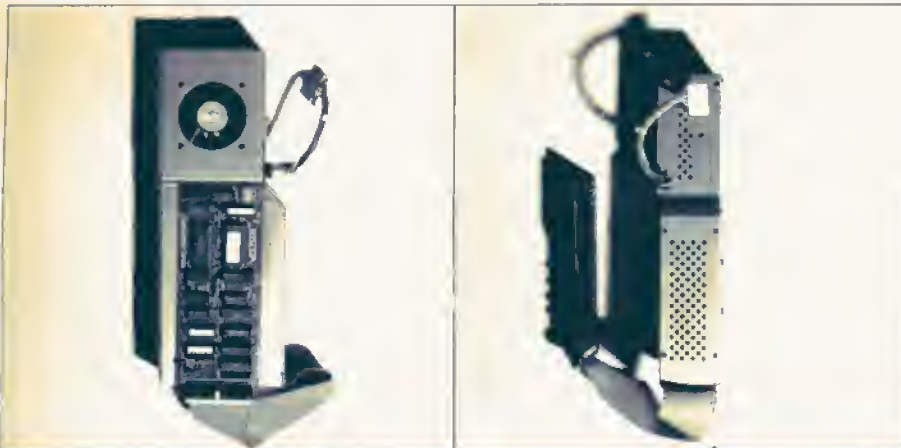
The Econ Pegasus was like a steak dinner at Mom's house with ice cream for dessert. The Pegasus carries a power pack with a little extra oomph for those overloaded motherboards, and, because it plugs into a standard SCSI card, it doesn't make you buy an extra card to create an external chain. One feature that seems particularly

well thought out is an easy-to-install jumper wire that delays startup until the drive mechanism is up to speed. This avoids the dreaded bouncing apple — the "Check Startup Device" message.

Frustrations include rocker DIP switches that look like sliding switches (we nearly got lead poisoning from stabbing ourselves with a pencil before we figured that one out) and no external-activity LED (light-emitting diode). The software includes a GS/OS "activity light," which blinks away in the upper right-hand corner of your desktop screen, but ProDOS aficionados will have to either listen carefully or bone up on their x-ray vision. To be fair, this problem is shared by all the internal drives we tested, but at least the Vulcan Gold offers a light on the interface card and a place to plug in your own LED.

	APPLE 3.5"	ECON PEGASUS	TMS SHADOW	VULCAN GOLD	ZIPDRIVE GS
<b>Size</b>	0.8MB	100MB	100MB	100MB	40MB
<b>Price</b>	\$399	\$599	\$449	\$1795	\$579
<b>Location</b>	external	internal	external	internal	internal
<b>Interface</b>	SmartPort	SCSI	SCSI	proprietary	proprietary
<b>Warmup to Welcome</b>	8.2 sec	11.3 sec	11.1 sec	11 sec	8.6 sec
<b>Welcome to Finder</b>	31.5 sec	20.4 sec	19.4 sec	12.3 sec	18.4 sec
<b>Launch AWGS</b>	65.5 sec	20.4 sec	20.7 sec	19.1 sec	18.3 sec
<b>GS/OS Verify</b>	27K/sec	447K/sec	468K/sec	231K/sec	221K/sec
<b>Linear read</b>	16.5 ms/bk	1.1 ms/bk	1.1 ms/bk	2.2 ms/bk	2.2 ms/bk
<b>Random read</b>	148.9 ms/bk	28 ms/bk	28 ms/bk	18 ms/bk	20.5 ms/bk
<b>OS overhead</b>	5 ms/bk	12.7 ms/bk	12.8 ms/bk	1.1 ms/bk	1.1 ms/bk

**Table. Speed tests.** K/sec = kilobytes per second; ms/bk = milliseconds per block; AWGS = AppleWorks GS; OS = operating system; 40MB ZipDrive IIcs = largest ZipDrive model currently available for GS.



**NAME:** Vulcan Gold 100  
**MAKER:** Applied Engineering

**ALIAS:** The Godfather  
**MECHANISM:** Connor CP 3000

**REMARKS:** Makes you a promise you may want to refuse. Specializes in big investments, random hits. Heavyweight player in GS/OS, DOS, CP/M, Pascal racks. Approach with caution.

No matter how many times you've seen a ton of complicated electronics packed into a single custom integrated circuit, you'll still marvel at the microsimplicity of the Zip. The whole unit is less than 8 inches long, 3 inches high, and three-quarters of an inch thick. Installation? What installation? Open your case and plug it into an empty slot. As with the Vulcan Gold, if you want to add an external SCSI chain, you'll have to buy another card.

The ZipDrive IIGs ships with the Finder and Vitesse's Wingz pre-installed — you select which one you want to use via a HyperStudio front-end screen that appears when you first fire up the drive. Zip includes one of the most comprehensive manuals around, as well as an introductory HyperStudio stack that leads neophytes through the installation process. The stack offers experts the option to "test

out" of the instructional sequence, but there's no "stop" key, except at the very start. If you blow one of the oddly worded questions you have to watch the whole presentation over again.

Zip includes the entire Vitesse Salvation package of hard-drive utilities, an eye-popping bonus for power users. Despite this, Zip representatives insist they're aiming their drive at the plug-and-play market. Their pitch promises confused computerists a hard drive that's as easy to install and use as another floppy.

Finally, the 600-pound gorilla of the internal drive market: the Vulcan God (oops, *Gold*) from AE. It's big, it's bad, it's fast, it costs a bloody fortune, and heaven help you if something goes wrong — tech support costs \$1.50 a minute. Thanks to its proprietary interface, the Gold outperformed every other drive in nearly every

area of our tests, except cost. Also, it's the only drive of the lot that can handle GS/OS, DOS 3.3, CP/M, and Pascal partitions — a weighty plus for Apple II veterans.

But if you say you want a piece of the Gold, ask yourself, "Do you feel lucky, punk?" You'd better, because if this is your first Vulcan, you're going to drop at least \$950 (street price) for the 100-megabyte version. (If you already have a Vulcan, the Gold upgrade is \$50.) If you buy a new Gold direct from AE, the list price for the 100-megabyte drive is \$1795. It's an investment you need to consider carefully. You can't take it with you to another computer; you also have to buy another card if you want any external SCSI devices.

We loved the original Vulcan, expensive as it was, because it was the only reliable internal drive available. But with a RamFast/Pegasus combo ripping and snorting around our GS, the Vulcan Gold looks a little like George Foreman: great in its time, but now just overweight and overpaid.

## FRUITS OF OUR LABOR

When the smoke blew off, the sweat dried, and the little pieces stopped twitching, certain facts became clear. If you purchase a TMS Shadow, you're hedging your bets against the future with an easily movable external SCSI drive. But if physical size isn't a factor, you could grab a larger TMS Pro series drive that picks up where the Shadow leaves off, for the same amount of money.

The ZipDrive IIGs comes out the hands-down winner for simplicity, but lack of an external SCSI port prevents us from awarding it the all-around medal. The Vulcan Gold's speed and versatility make it an impressive warrior, but its cost may leave you in the red for months. If you must buy an internal hard drive, pick up the best combination of speed and cost effectiveness available: a Pegasus 100i and a RamFast SCSI card.

The sales rep won't ask for proof of age if you go out and buy a hard drive, and Jerry Falwell won't threaten you with hellfire and damnation. But think of all the poor, abused floppy disks you'll be putting out of work, not to mention the lustful craving for bigger drives that will inevitably ensue. You'll be sorry if you buy a hard drive — just don't say we didn't warn you. □

## PRODUCT INFORMATION

**Apple II High-Speed SCSI Card**  
Apple Computer Inc.  
20525 Mariani Ave.  
Cupertino, CA 95014  
(408) 996-1010  
\$129

**Pegasus 100i**  
Econ Technologies  
P.O. Box 195356  
Winter Springs, FL 32719  
(407) 365-4209  
\$589

**ProSel-16**  
Charlie's AppleSeeds

9081 Hadley Place  
San Diego, CA 92126  
(619) 586-1297  
\$89.95

**RamFast SCSI Revision D**  
CV Technologies  
1800 East Whipp Road  
Dayton, OH 45440  
(513) 435-5743  
\$199 256K, \$279 1MB

**Shadow 105 LPS**  
TMS Peripherals  
1120 Holland Drive  
Suite 16  
Boca Raton, FL 33487-2729

(800) 275-4867  
\$449

**Vulcan Gold 100**  
Applied Engineering  
P.O. Box 5100  
Carrollton, TX 75011  
(214) 241-6060  
\$1795, \$49.95 upgrade

**ZipDrive IIGs**  
Zip Technology  
5601 West Slauson Ave.  
Culver City, CA 90230  
(310) 337-1313  
(800) 937-9737  
\$579